ARPN Journal of Engineering and Applied Sciences, 2018, vol.13, N6, pages 2195-2201

Modeling and calculation of the control unit for the focus position at laser-field welding

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2006-2018 Asian Research Publishing Network (ARPN). Ensuring the quality of laser-field welding requires monitoring not only the energy parameters of radiation and the intensity of the electrostatic field, but also the position of the focal spot. The calculation of the control channel for the laser radiation focus position during welding, which determines the parameters of the welded seam quality, is performed in the work. The active optoelectronic system parameters for the adjustment subsystem of the focus position relative to the seam with laser illumination of the seam are calculated, the model of the control channel is suggested taking into account the thermophysical phenomena occurring in the welding zone.

Keywords

Focus, Laser, Laser welding, Laser-field technology

References

[1] A.G. Grigoriants, I.N. Shiganov, A.I. Misyurov. 2006. Technological processes of laser processing: Proc. Manual for universities (Moskow: Publishing House of the Moscow State Technical University. N.E. Bauman). 664

[2] A.M. Filachev, I.I. Taubkin, M.A. Trishenkov. 2005. Solid state photoelectronics. Physical basis. (Moscow: Fizmatkniga). 384

[3] D.A. Bashmakov. 2010. Model for calculating the parameters of laser thermal hardening, taking into account the influence of the electrostatic field. Socioeconomic and engineering systems: research, design and optimization. 2: 10-14

[4] D.A. Bashmakov, I.H. Israphilov, A.T Galiakbarov, 2014. Research on influence of temporary distribution of power of laser radiation with a hybrid processing on a depth heat affected zone. Journal of Physics: Conference Series. 567(1): 012022

[5] I.H. Israphilov, D.A. Bashmakov, A.T. Galiakbarov, P.A. Mandrik. 2014. The mathematical description of the thermal combined laser and plasma impact on a material. Contemporary Engineering Sciences. 7(12): 569-576

[6] R.M. Aleev, V.P. Ivanov, V.A. Ovsyannikov. 2004. Non-cantilever heat-vision devices. Fundamentals of theory and calculation. (Kazan: Publishing house Kazansk. University). 228

[7] S.M. Portnov, R.R. Saubanov, R.A. Kisaev, I.N. Kuznetsov, I.Kh. Israfilov, V.V. Zvezdin, A.I. Nugumanova. 2011. The system for controlling the heat treatment process by concentrated energy flows of the surface of parts. Global scientific potential-scientific and practical journal. 8: 95-100

[8] V.V. Zvezdin, A.V. Khamadeev, R.K. Fardiev, D.I. Israfilov, D.A. Bashmakov. 2007. Influence of the mode composition of laser radiation on the zone of thermal action in metals. Vestnik KGTU im. A.N. Tupoleva. 2: 84-85